

Claims

1. Modified S-hydroxynitrile lyase, which is obtained by modifying at least one amino acid in the helix D3', helix A, and β -sheet 2 domains in the amino acid sequence of wild-type S-hydroxynitrile lyase.

2. The modified S-hydroxynitrile lyase according to claim 1, where the wild-type S-hydroxynitrile lyase is derived from cassava (*Manihot esculenta*) or Pará rubber tree (*Hevea brasiliensis*).

3. The modified S-hydroxynitrile lyase according to claim 1, which is obtained by modifying at least one amino acid in the region between amino acids 15 and 28, the region between amino acids 32 and 36, or the region between amino acids 163 and 174 in the amino acid sequence as shown in SEQ ID NO: 2 or by modifying at least one amino acid in the region between amino acids 15 and 28, the region between amino acids 32 and 36, or the region between amino acids 162 and 173 in the amino acid sequence as shown in SEQ ID NO: 4.

4. The modified S-hydroxynitrile lyase according to claim 1, which is obtained by modifying at least one amino acid selected from amino acids 21, 163, 165, 169, 172, 173, and 174 in the amino acid sequence as shown in SEQ ID NO: 2.

5. Modified S-hydroxynitrile lyase comprising at least one amino acid substitution in the amino acid sequence as shown in SEQ ID NO: 2 selected from:

- a) substitution from lysine to aspartic acid, glutamic acid, or asparagine at position 21;
- b) substitution from glycine to aspartic acid or glutamic acid at position 165;
- c) substitution from valine to leucine at position 173;
- d) substitution from methionine to leucine at position 174; or

e) substitution from threonine to aspartic acid, glutamic acid, or serine at position 163.

6. Modified S-hydroxynitrile lyase having the amino acid sequence as shown in SEQ ID NO: 6, 8, 16, 20, 22, 26, 28, 32, 36, 40, 42, or 44.

7. The modified S-hydroxynitrile lyase according to any one of claims 1 to 6, wherein the temperature at which enzyme activity is reduced to half the original level via heating for 30 minutes is higher by 1°C or more than that for wild-type S-hydroxynitrile lyase.

8. DNA encoding the amino acid sequence of the modified S-hydroxynitrile lyase according to any one of claims 1 to 7.

9. DNA encoding the amino acid sequence as shown in SEQ ID NO: 6, 8, 16, 20, 22, 26, 28, 32, 36, 40, 42, or 44.

10. A method for producing modified S-hydroxynitrile lyase comprising culturing a host cell having the DNA according to claim 8 or 9 introduced therein and recovering a protein having S-hydroxynitrile lyase activity from the resulting culture product.

11. A method for producing optically active cyanohydrin comprising allowing the modified S-hydroxynitrile lyase according to any one of claims 1 to 8 to react with a carbonyl compound and cyanide.

12. A method for improving stability of S-hydroxynitrile lyase by modifying at least one amino acid in the helix D3', helix A, and β -sheet 2 domains in the amino acid sequence of wild-type S-hydroxynitrile lyase.